

Algorithmic Foundations for Real-Time and Dependable Spacecraft Motion Planning

Completed Technology Project (2012 - 2017)



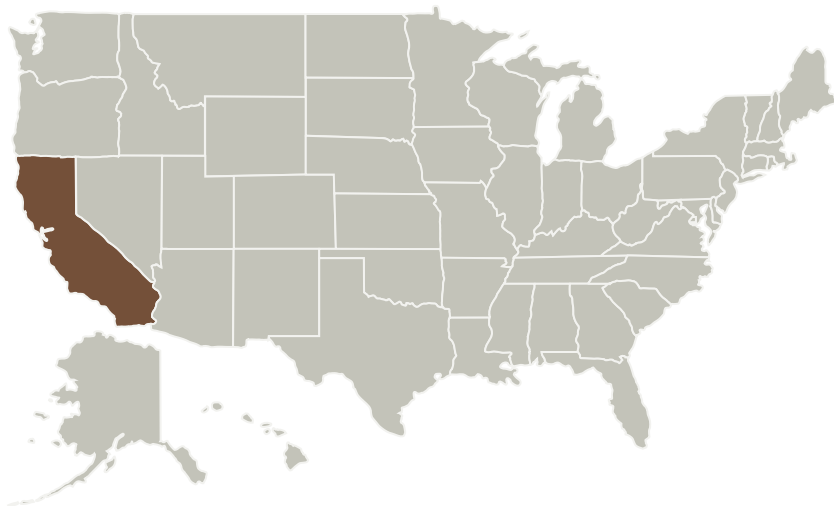
Project Introduction

The objective of this project is to devise real-time, efficient and dependable algorithms for spacecraft autonomous maneuvering, with a special focus on dynamic and cluttered environments typically encountered during proximity operations. Specifically, this project will devise a technology for the online planning of trajectories, which together with reliable environmental sensing and autonomous high-level decision making is a key enabler for autonomous spacecraft navigation. The approach will be to leverage recent algorithmic advances in the field of robotic motion planning to spacecraft control. This will entail the study of the theoretical underpinnings for applying robotic planning algorithms to spacecraft control, and of practical algorithms for integration within the overall spacecraft autonomy module. The proposed technology has the potential to be a key enabler for both near-Earth and deep-space missions; examples include on-orbit satellite servicing and missions to satellites in the Saturnian and Uranian systems.

Anticipated Benefits

The technology has the potential to be a key enabler for both near-Earth and deep-space missions; examples include on-orbit satellite servicing and missions to satellites in the Saturnian and Uranian systems.

Primary U.S. Work Locations and Key Partners



Project Image Algorithmic Foundations for Real-Time and Dependable Spacecraft Motion Planning

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Organizations Performing Work	Role	Type	Location
Stanford University(Stanford)	Lead Organization	Academia	Stanford, California

Primary U.S. Work Locations
California

Images



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Project Image Algorithmic Foundations for Real-Time and Dependable Spacecraft Motion Planning
(<https://techport.nasa.gov/image/1715>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Stanford University (Stanford)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

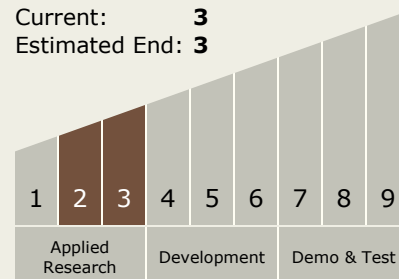
Hung D Nguyen

Principal Investigator:

Marco Pavone

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.3 Motion Planning

Target Destinations

Earth, Others Inside the Solar System